SPRING MEADOW LAKE SITE
HELENA, MONTANA

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3.0 DESCRIPTION OF THE PROPERTY

The Spring Meadow Lake site is comprised of approximately 20 acres of land that has been impacted by past mineral processing and sand and gravel mining. The site consists of portions of Spring Meadow Lake State Park and the Montana Department of Fish, Wildlife, and Parks (FWP) Montana Wildlife Center. The history of the Spring Meadow Lake site is provided in Section 3.1. Section 3.2 presents a description of the current property, including site waste characteristics and historical features. Section 3.3 presents information about the two State-owned uses for the Spring Meadow Lake Site. The references cited in Section 3.0 are provided in Section 3.4.

3.1 SPRING MEADOW LAKE SITE HISTORY

Renewable Technologies, Inc. (RTI) is currently in the process of completing a detailed historical review for the Spring Meadow Lake site for the Montana DEQ/MWCB. RTI prepared a preliminary historical summary for the site that is the source for the following information (RTI 2005).

The first industrial use of the project area dates to 1892 when the Stedman Foundry and Manufacturing Company opened a foundry. Workers erected three stone buildings to house the complex and a variety of iron products were produced, presumably for local use. In 1901 the business folded due to insufficient funds. The Western Improved Wire Fence Company of the United States of America was the next site occupant, but its tenure was also short-lived and it abandoned the site by 1910.

The Northwestern Metals Company acquired the Stedman Foundry property in 1910 and installed a mill to process ore from its Comet, Bullion, and Crystal mine group in the Cataract Creek drainage basin south of Wickes, Montana. The 1,000-ton capacity mill employed the Baker-Burwell process which was said to work well on ores with high zinc content. Due to processing inefficiencies, however, the operation went into bankruptcy in 1915.

The New York - Montana Testing and Engineering Company formed circa 1916 and took over the Stedman Foundry property. Having both testing and milling equipment, the management handled gold-silver and manganese ores. It received manganese shipments from the Ophir Mine in Butte and unnamed Philipsburg mines, as well as material from the Valley Forge dumps near Rimini and possibly the Liverpool Mine in the Clancy district. This endeavor also was unsuccessful in the long-term, closing in 1920.

The facility presumably stood vacant for several years until the late 1920s when George F. Jacoby acquired it and the adjacent land. Jacoby and his partner Thomas Brownlow, using the name Helena Sand and Gravel, opened a gravel pit north of the old foundry and mill complex. They stored and repaired equipment in the stone buildings, two of which still stand today. Their sand and gravel operation expanded to include a ready-mix plant and remained in operation at the site until the late 1950s. Although the disposition of tailings from the earlier ore milling operations was not recorded in the sources consulted, it seems likely that some portion of the tailings on the property were removed during the Helena Sand and Gravel operations.

Since 1960, the Stedman Foundry property and associated excavated gravel pit have been used as an additional gravel pit operation, a construction business headquarters, and for land speculation. The Montana FWP first acquired land in the Spring Meadow Lake Park area in 1981.

3.2 DESCRIPTION OF THE CURRENT PROPERTY

For investigative purposes, the Spring Meadow Lake site has been divided into two areas based on the differing management divisions of the State Park and the Montana Wildlife Center. The State Park area consists of the developed State Park built around the former excavated sand and gravel pits. The State Park area also includes the east arm of Spring Meadow Lake that is nearly continuously ponded by the current water table elevation. Some portions of the east arm are seasonally dry when the water level of Spring Meadow Lake drops (winter time mostly).

The Montana Wildlife Center portion of the Spring Meadow Lake site was the original Stedman Foundry property that was also used as a custom leaching mill, floatation mill for gold-silver and manganese ores, and a facility area for gravel mining operations. During the sand and gravel mining period (1920 to 1960), the Montana Wildlife Center area likely housed the sand and gravel stockpiles, staging areas, and business offices. One of the old stone and wood buildings burned substantially in December of 2003. The remaining stone walls and concrete floor were demolished and hauled offsite in early 2004 and the area has been regraded. The Montana Wildlife Center has built several new chain-link fenced pens and shelters for wildlife. The Montana Wildlife Center opened in March 2004 and is currently operational.

3.2.1 Waste Characteristics

Tetra Tech EM Inc. completed a site inspection and hazardous materials inventory for DEQ/MWCB in 2004 (DEQ/MWCB 2004). As part of this inspection and inventory, Tetra Tech EM Inc. collected 81 soil samples from 29 backhoe pits; 26 soil samples from surface and shallow subsurface soil pits; 10 co-located sediment and water samples from the perimeter of Spring Meadow Lake; and 2 lake water samples from Spring Meadow Lake swimming areas where sand had been imported to cover the lake bottom. A field portable x-ray fluorescence (XRF) instrument was used to analyze for total metals in all soil samples following Method 6200 - Field Portable X-ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment (U.S. EPA, 1998). Twenty of the total 107 soil samples were also submitted to an offsite laboratory for total metals analysis by inductively coupled plasma – atomic emission spectrometry (ICP-AES) for 13 target metals.

The metals in the soil samples were dissolved from the matrix into an aqueous solution by acid digestion as described in Method 3050B - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA 1996). This digestion method involves a combination of nitric and hydrochloric acids plus the addition of hydrogen peroxide to assist in degrading organic matter in the samples. Method 3050B digestion is not a "total" digestion, but is instead a solubilization of "environmentally available" metals and may have values lower than total metals concentrations determined by XRF analysis.

ICP-AES metals analysis (Method 6010B) was used to determine the target metals concentrations in all soils, sediments, and water samples. The ICP-AES technique is a widely available metals analysis for samples that may have wide ranging metals concentrations and other matrix interferences.

The analytical results of the metals analyses are presented in Table 3-1. Approximately 10,000 cubic yards of tailings and other mineral processing wastes were identified within the site, including at least one subsurface pit or sump full of wet tailings. Contaminated sediments also were identified within Spring Meadow Lake along the southern shore of the main lake and the southern portion of the east arm of the lake.

TABLE 3-1: HISTORIC LABORATORY ANALYTICAL RESULTS
SPRING MEADOW LAKE SITE

Sampling Entity	Sample Date	Sample ID	Sample Media	Units	Depth (ft)	Arsenic	Copper	Manganese	Lead	Zinc
Chris Harada Carroll College [a]	7/2002	A4	Sediment	ppm	----	----	30	----	100	50
		A5			----	----	125	14,000	1,000	240
		A6			----	----	200	19,000	2,700	330
		A7			----	----	85	500	250	70
		B1			----	----	55	----	200	20
		B2			----	----	190	12,000	4,000	520
		B3			----	----	90	----	400	50
		B4			----	----	60	----	200	30
		B5			----	----	95	3,500	500	80
		B6			----	----	80	1,000	300	50
		B9			----	----	220	15,500	3,000	340
Montana FWP	5/2003	C0307-2203	Trout	µg/g [b]	----	<20	<2	<2	<10	22
		C0307-2204	Bass			<20	<2	<2	<10	39
	8/2003	C0308-3413	Water	mg/l	----	0.020	<0.002	0.017	<0.005	<0.005
		C0308-3414				0.020	<0.002	0.005	<0.005	<0.005
		C0308-3415				0.190	<0.002	1.410	<0.005	<0.005
	12/2003	C0312-4988				0.017	0.002	0.013	<0.005	<0.005
Montana DEQ	4/2004	SF1	Solid Matrix	mg/kg	----	9,070	487	1,160	69,900	5,450
		SF2				<100	300	463,000	2,030	6,340
		SF3				<100	184	255,000	1,210	7,550
Tetra Tech EM Inc.	7/2004	TP 104	Solid Matrix	mg/kg	1	2,910	224	27,300	2,410	3,700
					1.2	2,640	240	34,400	2,320	3,600
		TP 106			1	20,700	220	8,290	5,220	4,240
		TP 107			4	27,700	1,390	21,000	39,000	18,000
					5	1,250	505	228,000	2,730	7,940
		TP 109			12	57,500	3,300	949	28,600	29,700
		TP 111			2	34,200	905	1,370	23,100	10,900
		TP 113			1	451	175	1,410	819	4,180
		TP 115			2	5,890	516	43,700	4,260	2,150
		TP 116			4.5	951	83	24,500	915	1,000
		TP 119			1	8,980	443	111,000	5,840	6,020
		TP 120			1	2,920	390	220,000	2,480	5,580
					3	222	424	191,000	1,970	4,280
		TP 126			2	3,280	232	120,000	1,920	4,120
		TP 127			2	1,240	95	16,800	690	1,710
					4	163	41	1,250	95	172
		SS 204			0.5	302	108	6,180	468	1,010
		SS 206			0.1	2,430	327	176,000	2,160	5,020
		SS 207			0.1	2,200	312	170,000	2,120	4,310
		SS 216			0.5	1,520	210	70,100	1,340	2,640
		SD 101	Sediment	mg/kg	----	13	14	349	48	78
		SD 102				<10	16	293	79	88

TABLE 3-1: HISTORIC LABORATORY ANALYTICAL RESULTS (Continued)
SPRING MEADOW LAKE SITE

Sampling Entity	Sample Date	Sample ID	Sample Media	Units	Depth (ft)	Arsenic	Copper	Manganese	Lead	Zinc
Tetra Tech EM Inc.	7/2004	SD 103	Sediment	mg/kg	----	<10	<10	237	31	38
		SD 106				<10	<10	136	16	25
		SD 107				10	24	155	14	25
		SD 108				<10	33	193	39	37
		SD 109				136	112	628	105	310
		SD 110				2,130	156	48,800	1,480	2,280
		SD 111				12	15	278	38	76
		SD 112				726	96	25,000	1,030	1,150
		SW 101	Water	mg/l	----	0.009	<0.001	0.017	<0.003	0.010
		SW 102				0.017	<0.001	0.007	<0.003	0.010
		SW 103				0.017	<0.001	<0.005	<0.003	<0.01
		SW 104				0.017	<0.001	0.010	<0.003	<0.01
		SW 105				0.017	<0.001	0.010	<0.003	<0.01
		SW 106				0.016	<0.001	0.007	<0.003	<0.01
		SW 107				0.017	<0.001	0.008	<0.003	<0.01
		SW 108				0.017	<0.001	0.009	<0.003	<0.01
		SW 109				0.019	<0.001	0.009	<0.003	<0.01
		SW 110				0.240	0.001	0.380	<0.003	<0.01
		SW 111				0.017	<0.001	0.011	<0.003	<0.01
		SW 112				0.020	0.001	0.066	0.005	0.020

Notes:

[a] Concentrations were estimated from bar graphs
[b] Dry weight values reported for fish samples
ft feet
µg/g micrograms per gram
mg/kg milligrams per kilogram
mg/l milligrams per liter

The previous laboratory analytical results from the Carroll College, DEQ, and PA data (DEQ/MWCB 2004) indicate that the mineral processing wastes found at several locations on the Spring Meadow Lake site contain arsenic, manganese, and lead concentrations higher than background levels and at concentrations in the solid matrix materials above the recreational cleanup levels (50-day rock-hound/gold panner scenario) that may be applicable for assessing risks for human health (Tetra Tech 1996). The human health and ecological risk assessments will be completed as part of the RI for this site using both qualified historic analytical results and analytical results acquired during the completion of the RI.

The previous analytical results indicate that the sediments in the east arm of Spring Meadow Lake contain concentrations of arsenic, copper, manganese, lead, and zinc above freshwater sediment quality levels

(Washington State Department of Ecology 1997). Additional sediment sampling and analysis will be completed during the RI for this site. Sediment metal concentrations and cleanup levels will be evaluated during the ecological risk assessment portion of the RI. The Montana FWP collected five small-mouth bass and five rainbow trout in May 2003. One composite trout sample and one composite bass sample was prepared from the five fish and analyzed for metals. This fish data will be included in the ecological risk assessment to be completed during the RI.

The previous analytical results indicate that three water samples collected in Spring Meadow Lake contain arsenic concentrations above the numeric water quality standard for human health (0.018 milligrams per liter [mg/L]) (Montana DEQ 2004). In addition, two Spring Meadow Lake water samples contain manganese concentrations above the secondary standard (0.050 mg/L). This standard is based on effects on beneficial use of the water due to taste, odor, and staining.

3.2.2 Significant Historical and Cultural Features

On September 11, 1995, the Montana State Preservation Review Board approved the nomination of the Stedman Foundry and Machine Shop to the National Register of Historic Places. The site was placed on the National Register of Historic Places on April 4, 1996.

3.3 OWNERSHIP INFORMATION

The State of Montana purchased the State Park portion of the property from Reber Realty & Development in 1981 and the Montana Wildlife Center property from Walter and LaDonna Bell in 1995. Although both portions are owned by the State of Montana Department of FWP, they are managed under two separate Divisions within the agency. The lake portion of the site is managed by the Parks Division while the Montana Wildlife Center is under the Conservation Education Division. The mineral processing wastes associated with the Spring Meadow Lake site are found on both the Spring Meadow Lake State Park and the Montana Wildlife Center properties.

3.4 REFERENCES CITED

DEQ/MWCB, 2004. Abandoned Hard Rock Mine Priority Site Investigation and Hazardous Materials Inventory. Spring Meadow Site, Lewis and Clark County, PA 25-505. (Tetra Tech EM Inc.)

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